



## **Estimate of subsurface formation temperature in the Tarim basin, northwest China**

Shaowen Liu, Xiao Lei, Changge Feng, and Chunyan Hao

School of Geographic and Oceanographic Sciences, Nanjing University, Nanjing 210023, China([shaowliu@nju.edu.cn](mailto:shaowliu@nju.edu.cn))

Subsurface formation temperature in the Tarim basin, the largest sedimentary basin in China, is significant for its hydrocarbon generation, preservation and geothermal energy potential assessment, but till now is not well understood, due to poor data coverage and a lack of highly accurate temperature data. Here, we combined recently acquired steady-state temperature logging data, drill stem test temperature data and measured rock thermal properties, to investigate the geothermal regime, and estimate the formation temperature at specific depths in the range 1000~5000 m in this basin. Results show that the heat flow of the Tarim basin ranges between 26.2 and 66.1 mW/m<sup>2</sup>, with a mean of  $42.5 \pm 7.6$  mW/m<sup>2</sup>; geothermal gradient at the depth of 3000 m varies from 14.9 to 30.2 °C/km, with a mean of  $20.7 \pm 2.9$  °C/km. Formation temperature at the depth of 1000 m is estimated to be between 29 °C and 41 °C, with a mean of 35 °C; whilst the temperature at 2000 m ranges from 46~71 °C with an average of 59 °C; 63~100 °C is for that at the depth of 3000 m, and the mean is 82 °C; the temperature at 4000 m varies from 80 to 130 °C, with a mean of 105 °C; 97~160 °C is for the temperature at 5000 m depth. In addition, the general pattern of the subsurface formation temperatures at different depths is basically similar and is characterized by high temperatures in the uplift areas and low temperatures in the sags. Basement structure and lateral variations in thermal properties account for this pattern of the geo-temperature field in the Tarim basin.